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998125

NPIC/P&amp;DS/D/6-826

4 March 1966

## MEMORANDUM FOR THE RECORD

SUBJECT: Trip Report for Period 13 February to 2 March 1966.

1. [ ] monitored Project #998125 at the [ ] from 14 to 17 February 1966. [ ] returned to CONUS and [ ] inspected several optical manufacturers, monitored Project #997305, [ ] The more pertinent points of each visit are related in the following paragraphs.

2. [ ] The majority of the time was spent with [ ] discussing the AP-3 Analytical Stereo Plotter. Short periods of time were also spent with [ ]

We were very surprised to find that fabrication of the AP-3 had not been undertaken. We had been led to believe, [ ] representative that the instrument was just about complete and only zoom and the anamorphics need further attention.

[ ] has not started working on the zoom system. He is very hesitant about large zoom ranges and high power objective lens. He suggested that the present zoom and objective lens be used and that lens also be added between the eye pieces and the zoom to get the maximum magnification. This was rejected by the monitors. We suggested that he have an objective of 3.2x with a zoom of 1 to 3.2 and eyepieces of 10x. He did not take to the idea immediately but seemed in agreement before we left. He did state that this would take him about 6 months to work out, this organization does not use computer support for optical design.

We raised the question of using a point light source as a reticle but he is opposed to this and it does appear that there would be difficulties in fitting it into the system. The present dot size in the AP-2 is 20 microns but he says he can get one produced in Germany that will be 10 microns.

The monitor plans to get together with [ ] personnel to see with the affect of increased zoom range will have on the computer program and storage. At present it seems that the [ ] programs are based on a 2 to 1 range in focal lengths (Ex. 6-12, 12-24, 24-48) and a new tape must be entered for the desired range.

The anamorphic system seems to be a major stumbling block. [ ] has contacted several American companies about purchasing this portion of the system. [ ] hopes to be able to purchase a removable type system and adapt it to their instrument. Further information should be available next week when [ ] visits this country.

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It was agreed that the plotter table would be accepted as it is presently manufactured and [ ] would retrofit with Ball Screws in the U.S.

3. [ ] - Visited on 21 February 1966. [ ] - Assistant Head of Photogrammetric Dept., [ ] Photogrammetric Researcher, and [ ] - Optics Department.

[ ] plans to build a more comparator with a zoom of 2 to 80x with a least count of 1 micron and a positioning accuracy of 2 to 2 1/2 micron over the entire 9" x 9" plate. The measurements will be means of two angles instead of the conventional method. They already employ something like this on their PG-2 topo-plotter. They will divide a 90" angle into 100 parts (grads) then interpolate between these ticks to 1/100. They say they have a method of accurately doing this but will not be ready until fall of 1966.

They are also presently developing a stereo point transfer instrument. This will have a maximum magnification of 80x. There will be three stage plates and a sapphire needle and ball to make an indentation of 40-80 microns diameter in the emulsion on the glass plate.

[ ] is presently developing a stereo microscope, the prototype will not be ready for several months. It will have 10x and 25x eyepieces, a zoom of between 4 or 5 to 1 and give a magnification range of 5x to 180x. They predict a resolution of 200 lines/mm for the 8-40 range of zoom and about 500 lines/mm max at 180x.

[ ] feels that they could build a micro stereoc of just about the same accuracy.

All of their computing for optical design is done on a small French computer [ ] subsidiary). They are now checking the market for a larger storage computer. [ ] feels that a zoom of 6 to 1 for microscopes with a possibility of even going to 8 to 1.

They have studied aramorphic systems but have not built production models. They are producing aspheric lens.

4. [ ] Visited on 22 February 1966. Discussed Microscope development work with [ ] is presently working on a zoom microscope but there is nothing real definite at this type. They do feel that two models with different zoom ranges will be eventually produced with the larger range a 1 to 6 zoom. Research is also being carried out on Filar objectives but this is mostly in the higher magnifications, 3x is still the lowest power they have in this line. Several attachments for the M-5 microscope were demonstrated, the following group seem more closely related to our problems:

A. Drawing Tube - This fits both the M-5 mono and stereo pad version, it enables the operator to see a chart or piece of paper at the same time he is viewing the film.

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B. Photo Tube - This will produce a stereo pair of the object be viewed on the monoscopic version of the M-5. There are two versions, in the first the tube and film carrier are moved from one set position to another and the stereo pairs are produced on two frames of 35mm film. In the second a prism is reversed and the stereo pairs produced on a split 35mm frame.

C. Fully automatic micro camera - The operator sets in the film speed and the ocular magnification. The remainder is done automatically, this instrument employs a photo cell and associated electronics. This instrument will also take stereo photos but the film must be advanced a frame by the operator.

X1 D. [ ] is presently working on an arrangement that will enable the above adaptations to be used with 4" by 5" film.

E. By using a prism at the top of the photo tube they also are able to give a video presentation.

X1 [ ] informed us that the company will not usually develop a new line unless they have reasons to expect a production run of at least 200 microscopes.

[ ]

This organization is mainly occupied with manufacturing lens for camera manufacturers and zoom systems for amateur cameras. The 6 to 1 zoom they have for present 8mm movie cameras is being discontinued and they are busy producing a 5 to 1 for the new super 8mm film.

They do not handle many special orders unless they can expect further orders and the product must be similar to their present line. Our type of requirements (projection lens) would require a special run of at least 100 items and would be very expensive.

Their optical design problems are handled by two computers that are owned by the company.

This company does not have any experience in projection lens nor in anamorphics.

[ ]

This company produces stereo comparators, stereo plotters, sketchers, and shaders. Their American representative is [ ]

X1 Their stereo comparator, the SB-50, has a small computer, a tape punch and other required electronics. This instrument is somewhat different than most comparators, it incorporates reseau grids and the instrument only reads +10mm but the nearest grid intersection is used to reference the measurement. [ ] also produces its own electronics.

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Their stereo plotter is a little different in that it employs a mechanical 3 to 1 zoom.

This organization expressed interest in extending the zoom range and increasing the objective power. They use computers in their optical design work.

Their SB-50 might have some value as a stop gap measure while awaiting development and delivery of high precision comparators.

7. [ ] Visited on 2-28-66. The entire day was spent with [ ] the Managing Director, and [ ] the Technical Director of Research. Dr. [ ] discussed the study this company carried out for [ ] (Feasibility Study of the Optical System for the High Precision Stereo Comparator). He explained that it would require about 9 months of study, computer work, and ray tracing to design the system. After this it would require at least a year before all the optical parts could be prepared. The figure they gave [ ] is just a rough estimate and reflects the cost of delaying their own projects and tying up their small development staff for the period. The proposed anamorphic system was discussed and it appears that one pair of prisms for the anamorphic system with two mirrors, one moving in the X direction and the second in the Y direction as the prisms are tilted will work satisfactorily. The anamorphic system is achromatic but there will be some secondary spectrum. [ ] stated that there is an error in the report, the size of the angular diameter of the reticle is 1.67 minutes. They do not expect to have a ghost image of the reticle but they would check this out on their computers. [ ] expressed great interest in this optical requirement and it appears that he would welcome it as a challenge.

This company is one of 100 companies in [ ] this group produces television sets that are mainly sold in commonwealth countries and electronics that are delivered throughout the world. The U.S. representative [ ]

[ ] This representative also services their equipment and takes care of maintenance.

[ ] is small, it employs about 400 people of which [ ] and three graduate optical designers make up the development staff.

[ ] is presently putting out a new line of equipment, included in this is a 5 to 1 zoom stereomicroscope. This employs 10x eyepieces and has a true zoom range of 5 to 1, higher power objectives may be added. Resolution figures were not available but will be supplied in the near future. The instrument is priced at about [ ] Like most microscopes, this is convergent. Upon further questioning, [ ] stated that it would not be difficult to make this a parallel system, add rhomboids, and individual zoom. This might be worthy of further investigation.

[ ] has done some work in Modulation Transfer Functions.

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X1 A graduate student [ ] has just completed work for his doctorate on building an instrument to measure MTF. He has used this in checking the measured performance versus the calibrated capabilities of aerial cameras as well as checking the centering of the lens. This should be published in a few months. [ ] has also presented a paper on this subject. Its title is "The Application of Frequency Response in Optics" and presented at the 21st Thomas-Young Oration and it was printed Physical Society, Vol. 79, Part 5, No 511, 889-919. 25X

X1 [ ] is giving serious thought to producing the above MTF measuring instrument. [ ] 25X  
[ ] 25X

have also expressed interest in the instrument.

8. A courtesy call was made [ ] on 1 March 1966. A tour of the facility and discussion of related instrumentation problems absorbed most of the visit. 25X

9. Brochures were obtained from the various manufacturers and they are now available in the company files.

[ ] 25X  
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